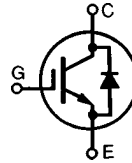


# HiPerFAST™ IGBT

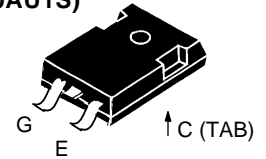
with Diode  
Combi Pack

$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 60 \text{ A} \\ V_{CE(sat)} &= 2.9 \text{ V} \\ t_{fi} &= 125 \text{ ns} \end{aligned}$$

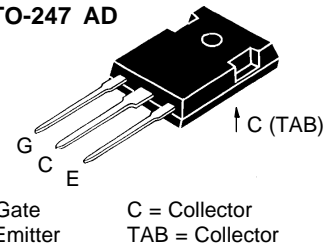


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	60	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	32	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	120	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 33 \Omega$ Clamped inductive load, $L = 100 \mu\text{H}$	$I_{CM} = 64$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	200	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
Maximum Lead and Tab temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
$M_d$	Mounting torque, TO-247 AD	1.13/10	Nm/lb.in.
<b>Weight</b>	TO-247 SMD	4	g
	TO-247 AD	6	g

TO-247 SMD  
(32N60AU1S)



TO-247 AD



## Features

- International standard packages  
JEDEC TO-247 SMD surface mountable and JEDEC TO-247 AD
- High frequency IGBT and antiparallel  
FRED in one package
- High current handling capability
- 2nd generation HDMOS™ process
- MOS Gate turn-on  
- drive simplicity

## Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode  
power supplies

## Advantages

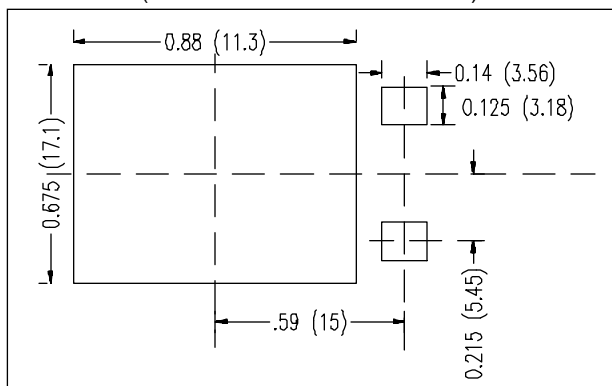
- Space savings (two devices in one  
package)
- High power density
- Suitable for surface mounting
- Switching speed for high frequency  
applications
- Easy to mount with 1 screw, TO-247  
(isolated mounting screw hole)

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 750 \mu\text{A}$ , $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$ , $V_{CE} = V_{GE}$	2.5		5.5 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			500 $\mu\text{A}$ 8 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$			2.9 V

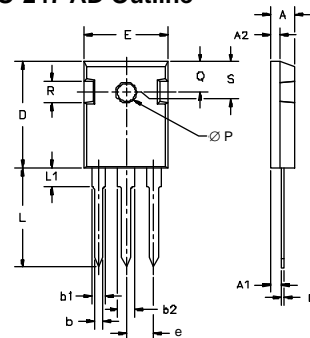
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ , Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$	15	20	S
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		2500	pF
$C_{oes}$			270	pF
$C_{res}$			70	pF
$Q_g$	$I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		125	nC
$Q_{ge}$			23	nC
$Q_{gc}$			50	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 100\text{ }\mu\text{H}$ , $V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 4.7\text{ }\Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		25	ns
$t_{ri}$			30	ns
$t_{d(off)}$			120	200
$t_{fi}$			125	175
$E_{off}$			1.8	mJ
$t_{d(on)}$			25	ns
$t_{ri}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 100\text{ }\mu\text{H}$ , $V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 4.7\text{ }\Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		35	ns
$E_{on}$			1	mJ
$t_{d(off)}$			140	ns
$t_{fi}$			260	ns
$E_{off}$			4	mJ
$R_{thJC}$				0.62 K/W
$R_{thCK}$			0.25	K/W

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_F$	$I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ , Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $d \leq 2\%$			1.6 V
$I_{RM}$	$I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ , $-di_F/dt = 240\text{ A}/\mu\text{s}$ $V_R = 360\text{ V}$ $I_F = 1\text{ A}$ ; $-di/dt = 100\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$		10	15 A
$t_{rr}$			150	ns
$t_{rr}$			35	50 ns
$R_{thJC}$				1 K/W

**Min. Recommended Footprint**  
(Dimensions in inches and mm)

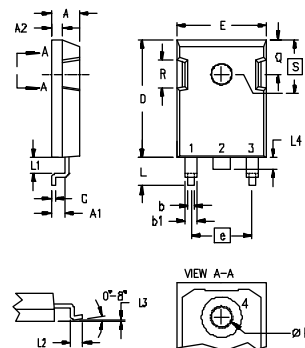


**TO-247 AD Outline**



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	.242	BSC

**TO-247 SMD Outline**



- Gate
- Collector
- Emitter
- Collector

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45	BSC	.215	BSC
L	4.90	5.10	.193	.201
L1	2.70	2.90	.106	.114
L2	2.10	2.30	.083	.091
L3	0.00	0.10	.00	.004
L4	1.90	2.10	.075	.083
ØP	3.55	3.65	.140	.144
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190
S	6.15	BSC	.242	BSC

IXYS reserves the right to change limits, test conditions, and dimensions.

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